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Expectations and Realities of My First Undergraduate Research Experience

Undergraduate research experiences (URE) were traditionally considered an opportunity reserved for students voicing their interest in pursuing subsequent graduate degrees (Dodson et al., 1997; Seymour et al., 2003). Today, URE are common among universities and are valuable to the overall development of undergraduate students-whether interested in advanced degrees or not (Dodson et al., 1997; Seymour et al., 2003, Wimbush and Amstutz, 2011). Prior to participating in undergraduate research, I held several misled opinions toward researchers and Animal Science as a discipline. Subsequently, my opinions changed completely, causing me to feel a bit judgmental and wonder why I had not gotten involved sooner. The goal of telling my story is to help nudge other undergraduates with similar reservations towards participating in a research effort. Although presented with challenges, the time I spent in the laboratory was beneficial in establishing a sense of belonging while at Washington State University (WSU), utilizing the scientific method, and for clarifying an exciting area of physiological research.

Initial Expectations

After a two year integrated ecological agriculture curriculum and attaining a bachelor's degree from a liberal arts university, I entered my second undergraduate degree program in biology at WSU. My goal was to complete prerequisites for physician's assistant school, and previous interests in both medical and veterinary sciences caused me to cross department lines. I enrolled in my first Animal Science course because I thought the class would be interesting; however I did not consider it appealing as a career. I also recall wondering if I would have to modify my wardrobe to include Carhartt's and rubber boots to gain acceptance amongst the "Aggie" students I had seen around campus.

Three times a week I crossed campus into a different "city," and as expected, I felt out of place. My first week was sprinkled with various uncomfortable encounters and students showing me an outsider's welcome. But as time progressed, my rank was promoted from "that stranger" to "he's ok, I have a class with him," I began to feel at ease in my new environment. I discovered that the students were in fact quite pleasant and would often work together in the study lounge to ensure that those having difficulty became successful. I was surprised to see that even at a large university, there was a strong sense of community among students and faculty in the department, and I felt fortunate to become a part of it.

One month after the class began, the professor observed my growing interest in molecular biology. He offered me the opportunity to "hang around" his laboratory and shadow a Ph.D. student working with primary adipocyte culture. The informal invitation left me feeling a bit apprehensive as I had attended general chemistry and biology laboratories but had never been exposed to a professional research environment. I had seen the Ph.D. student in lectures; but had never spoken with him personally, and was intimidated of being evaluated by someone with much more experienced than me. I assumed that he would be arrogant and treat me as an inconvenience which kept me from participating initially. Believing that this experience was important to my future, I overcame my fears of being embarrassed or judged and decided to participate in hopes of taking my education to its next level. When I approached the graduate student, I was surprised to hear that he was excited about the prospect of my involvement in the laboratory. At minimum, I was a new face that presented an outlet for discussion topics other than fat cell metabolism; at most, I could be a prospective predecessor when he returned to his home country of Brazil. My maturity compared to most undergraduates, and non-traditional background facilitated our initial connection and improved my outlook going into the experience.

My First Day

Upon entering the lab, my initial reaction was one of cautious optimism. I was relieved to see familiar equipment around the room, but uneasy in knowing many objects were still foreign and that I was expected to apply classroom knowledge to actual scientific experiments. Following an introduction to the various features of the laboratory and having

had my formal safety lecture, my first tasks included preparing buffers, counting cells and changing media in culture flasks. I was so concerned with making mistakes that I weighed reagents multiple times and asked for approval on every measurement, which took considerable time. Luckily, my inexperience and apprehensions were familiar to my supervising graduate student. He responded by offering tips on working efficiently in the laboratory and stressed the importance of keeping meticulous notes. As the day progressed, I regained my composure and was later praised for my ability to take direction and learn quickly. I remember the excitement of using my laboratory skills acquired earlier in my education for actual scientific research. It felt rather rewarding and increased my desire to return the next day.

As the weeks passed, my fears of contaminating the laboratory or damaging technical (and expensive) equipment dissipated. I also began to gain competency in communicating scientifically by becoming frequently engaged in laboratory activities. As this was a voluntary opportunity, it was up to me to show initiative. I spent many free hours before and after class asking questions in the laboratory, meeting other members of the department and gaining credibility as a member of the research team by being present day to day. Towards the end of my research experience, I was invited to the meat processing facility on campus to assist in acquiring tissue samples from cattle. Actively participating in collecting the samples felt like an affirmation of initiation/nod of approval from my mentor for my commitment and efforts in the lab, and it has left a lasting impression to this day. In addition, my first hand encounters with animals and industry workers disproved negative misconceptions I had previously held about meat production and improved my interest in Animal Science as a career.

Hurdles

Regardless of my studious efforts, I recall routinely leaving the laboratory with more questions than answers. When my supervisor could not provide the answer, I turned to my faculty mentor for insight. Unexpectedly, I was not provided answers outright, rather I was directed to specific journal articles and encouraged to decipher the answers on my own. This was a new technique to me and required expansion beyond my familiar resources. I was startled to learn that there were not definitions in book chapters on the material I was expected to be familiar with, but also excited to be involved with such a fresh area of research. Initially, the literature was overwhelming. Meticulous details and unfamiliar language frequently left me feeling confused and frustrated. Through perseverance, repeated exposure to the literature, and additional clarification from my mentor, I did eventually become comfortable with the dynamic language of muscle biology and lipid metabolism. I must say there is no easy way to become familiar with a large body of information other than to dive in. While in my first weeks, I regularly found myself following literature sources backward to find additional information needed to communicate effectively with the group. However, the research experience facilitated my ability to navigate scientific literature which is a skill I am grateful to have attained. Therefore, I feel it is of great benefit to become accustomed to the literature review process before graduate school, and UREs present that opportunity.

Expectations and Realities

Some students may be under the impression, as I, that working in a laboratory setting is for those who prefer to work independently and avoid social interaction. My experience did not involve any solitary confinement at a fume hood. Instead, it required working collaboratively in a group and utilizing member's diverse backgrounds and skill sets to contribute to the current body of knowledge regarding lipid metabolism. It was a positive environment that was energizing to be around. By participating in undergraduate research, I gained exposure to a professional environment/network, made a few friends, and developed core skills required of all successful scientists.

My mentor and supervising graduate student also provided me with an opportunity for participation in the publication process. As undergraduates are low ranking members of the research team, opportunities for publication are quite rare. However, it is an attainable achievement as undergraduates here in the Animal Sciences department at WSU have made significant contributions to scientific literature. For example, from 1993 – 1997, at least twenty undergraduate students participated in research projects in the muscle biology laboratory, resulting in five scientific publications (Dodson et al., 1997). The ability to be published in one's field of study as an undergraduate is unique, and provides a significant advantage when applying for graduate schools or industry positions. In addition, becoming familiar with the process of revision was worth all the extra hours I spent reading journals and loitering outside of offices waiting to ask questions of my supervisors. I gained access to advantaged information and I am grateful to have been given insight to the challenges graduate students commonly encounter in their first years of research.

Current Perspectives

Undergraduate research experiences allow enthusiastic students access to knowledge and resources customarily reserved for established members of academia. To be successful in research, a student must be self-motivated, willing to become thoroughly familiar with scientific literature and communicate effectively with others in a concise, meaningful way. Therefore, faculty mentors often handpick URE students observed to be capable and enthusiastic because they must donate time outside of class and demonstrate patience by allowing for mistakes and learning to take place (Dodson, 1997; Seymour et al., 2003). Through my research experience, I encountered many challenges but ultimately improved my skills in reading comprehension, communicating scientifically and thinking critically. In addition, I gained a sense of confidence in my abilities as a member of a research team and found a place to belong amongst thousands at a major university. In my opinion, it would greatly benefit anyone with the opportunity to participate in an URE to do so. In addition to the positive results I have experienced, completion of URE has also been reported to result in many tangible benefits such as higher starting salaries (Coco, 2000; Gault et al., 2008), higher job satisfaction (Devine et al., 2007; Gault et al., 2008) and increased job opportunities after graduation (Coco, 2000; Devine et al., 2007). Looking back, I realize that many of my initial expectations about participating in a scientific research setting were unfounded and the reality of being a researcher was more exciting and rewarding than I anticipated.

Conclusion

Through my time spent in the laboratory, I gained competence in basic cell culture techniques and became a contributing member of a research team. In addition, I expanded my opportunities by taking chances and testing my personal boundaries. This required a thick skin, persistence and the ability to be flexible and grow as an individual. Interestingly, I was told these were all qualities of a good researcher on my first day in the laboratory. I developed lasting relationships with faculty members whom I may later call upon for letters of recommendation and whom will forever be an inspiration to me in my future endeavors. I plan to take knowledge and skills from my research experience and apply them to the pursuit of a professional career in health sciences, working to treat disorders such as cancer, metabolic syndrome and obesity. For better or worse, my mentor and supervisor gave me an accurate portrayal of life as a researcher and changed my perspectives about careers in laboratory research settings in a positive way. Although my abilities to think critically, work effectively in a group, and manage time, were tested to their limits, overall my undergraduate research experience was an enjoyable and rewarding journey with benefits that will last a life time.

References

Seymour, E., A.-B. Hunter, S.L. Laursen and T. Deantoni. 2003. Establishing the benefits of research experiences for undergraduates in the sciences: First findings from a three-year study. In: Ethnography & Evaluation Research, Center to Advance Research and Teaching in the Social Sciences, University of Colorado, Boulder, CO 80309-0850 pp. 493-534.

Kardash, C.A.M. 2000. Evaluation of an undergraduate research experience: Perceptions of undergraduate interns and their faculty mentors. Journal of Educational Psychology 92(1):191-201.

Gault, J., J. Redington and T. Schlager. 2008. Undergraduate business internships and career success: Are they related? Journal Marketing Ed. 22(1):45-53

Dodson, M.V., M.E. Fernyhough and B.B. Holman. 2006. Advising graduate students: Mentor or tormentor? NACTA Journal 50(4):39-43

Dodson, M.V., M.E. Fernyhough and J.L. Vierck. 2006. Work environments are critical for maximum productivity in teaching and research efforts in animal sciences. NACTA Journal 50(4):64-67

Dodson, M.V. 2001. Being a balanced teacher. NACTA Journal 54(4):41-45

Divine, R., J. Linrud, R. Miller and J.H. Wilson. 2007. Required internship programs in marketing: Benefits, challenges, and determinants of Fit. Marketing Ed. Rev. 17(2): 45-52.

Coco, M. 2000. Internships: A try before you buy arrangement. S.A.M. Advanced Management Journal 65: 41-45.

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Interviews with Farming and Food Systems Experts

To gather additional resource information and broaden the scope of discussion in agroecology and other courses, we have implemented an exercise using interviews with experts outside the classroom. These activities introduce students first hand to farmers, consultants, input suppliers, and others directly involved in the production process, as well as with processors, distributors, marketers and nutritionists in the food system. Each student reports back providing an expanded picture of the farming and food system with perspectives and dimensions that enrich the topics presented and discussed during the lecture sessions. Through the questions posed to people interviewed, students move the content of the course and extend the discussion to a broader audience. The idea of "interview as outreach" is an innovative way to generate discourse in the community about issues related to the future of farming and food systems.

Objectives of the interviews in the community and reports back to class are to 1) expand the breadth of information resources and opinions about current and future food and farming systems, 2) explore new perspectives on content of agroecology or other courses through interactions with people in the community and 3) challenge key people in the farming and food system to think about issues central to future sustainability of the system and the long-term consequences of current practices and systems design.

Methods include: 1) an orientation about the interview process, 2) goals and conduct of interviews, 3) how to take notes or record results, 4) the format and value of a written report of the activity and 4) how this may be reported back to maximize the benefit of the interview for our class learning community. For the farming systems interview, students are urged to explore different opinions about the success of current systems and their limitations, and to ask about how their subjects view potential changes in the future of farming practices and design of systems. Most frequent interviewees include farmers, crop consultants, seed, fertilizer and chemical pesticide sales people, coop elevator managers, organic certifiers, and government officials involved in agriculture, including regulation and support programs. For the food systems interview, we again explore the successes and challenges in current systems, related issues such as nutrition, diet-related illness, and comparative advantages and disadvantages of local and global food systems. Those often chosen for interviews include food processors, wholesale and retail marketers, nutritionists, people involved in institutional food programs, health specialists, and others active in the food system. Students choose 1)who they will interview, 2) set up appointments, 3) conduct the interviews and 4) submit a maximum two-page report on the results. We then spend at least one class period summarizing the interviews and discussing the results. Substantial literature is available on the process of designing, conducting, and summarizing interviews; for example, Kvale and Brinkman (2009).

Outcomes include improved student understanding on practical applications of theory and information discussed in class, an appreciation of the range of opinions of people in farming and in the community about current and future systems. Classroom discussions often transcend those in the syllabus. Additionally, we speculate that an increase in community awareness and discourse about present and future food systems occurs as a result of the interviews.

Presentations in class have resulted in a rich array of facts about current systems, ideas about how they function as well as some of the shortcomings, and perspectives about the future. In farming systems reports, there is generally a satisfaction with current systems, a lack of concern about future resource scarcity, a concern about prices for commodities and the inputs needed to produce them, and a projection of future systems that closely resemble our current practices, rotations, and commodities. The results change to a broader concern about higher level issues and about the sustainability of future systems only if there is an interview with someone outside the mainstream, such as an organic or biodynamic farmer, a diversified crop/livestock farmer, or a vegetable producer who does direct marketing. One exception is a concern about farmer age, and who will inherit the land and farm in the future and topics that come from interviews with both conventional and alternative interviewees.

In food systems interviews, there is a wider range of opinions about current food and systems, the availability and cost of quality food, current diets and related health issues, and potential long-term alternatives. Although there are limited people with innovative opinions about how future food systems will differ from those today, there is a general appreciation that current foods and diets are detrimental to health. Although some favor regulation and government intervention in the marketing of fast food and other prepared foods, there is a general agreement that consumers must make their own decisions from the options available. There is little support for taxation of harmful foods, incentives for a more healthy diet, or

regulation of any kind, although many of the reports include statements on the importance of nutritional education and future informed decisions by consumers. There is a concern about childhood diets, and the current epidemic of obesity and how this can be solved through education and better meals in schools. Budget concerns often come up in discussions about changes in school, hospital, and institutional building cafeterias and food systems. At times, there is discussion of how the university dormitories and cafeterias could provide a healthy model for future consumers.

In summary, the interviews provide an opportunity for students to interact with farming and food specialists outside the classroom, and to bring in ideas to enrich the discussion. Apparently, most of those interviewed support the status quo, although some do question current practices and systems, and provide some alternatives for the future. We speculate that even the process of asking questions about the future will cause some thought and discussion about present systems, and the long-term result will be a broader impact of class topics than is possible with only our internal discussions.

Reference

Kvale, S., and S. Brinkman. 2009. InterViews: Learning the craft of qualitative research interviewing. Sage Publications: Thousand Oaks, CA.

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Empowering Volunteers to Find Viable Solutions to Problems

Educators understand the value and importance of mobilizing volunteers to achieve goals beyond what one can do themselves. With proper leadership, an effective volunteer base is a valuable resource for classrooms, clubs, school committees and special interest groups. Keeping volunteers aligned with organizational expectations, philosophies and goals can be a challenge especially when conflict complicates this relationship. Among the challenges of working with volunteers, are solving interpersonal problems and conflict. How do educators empower volunteers to find viable solutions to problems while maintaining the philosophies of their groups?

The ability to solve problems efficiently and effectively is extremely valuable. Positive management of problem situations can retain quality volunteers and increase volunteer ownership of their efforts. Many techniques can be used to manage conflict, but one in particular can be empowering to volunteers, adaptable and easily implemented by educators.

History and Basic Principles of the Solution Focused Therapy

Solution Focused Therapy (SFT) has its roots in clinical social work and was developed by Steve de Shazer (1940-2005), and Insoo Kim Berg (1934-2007) in the 1980's (De Shazer et al., 1986). The approach is goal-driven and focuses on strengths (what is good that is happening) rather than on weaknesses, such as problems (Wallerstedt and Higgins, 2000). While it is primarily utilized by therapists as a tool to guide clients, its foundations can also be easily adapted for use in other disciplines. The process empowers people to take ownership of a situation and outline their own steps in solving the conflict.

The Miracle Question: Probably the most well-known and popular intervention within the solution-focused approach is the miracle question (de Shazer, 1988). The miracle question is a method of framing questions to help a person presenting the problem to envision how the future will be different when the conflict/problem is no longer present. During this process of questions, goals can often be identified. Careful consideration to how the question is framed will help people move away from what the problem is and focus on how to begin solving the issue. For example:

"If you woke up tomorrow, and a miracle happened so that you no longer felt your club officers do not follow through with their responsibilities, what would you see differently? What would the first signs be that a change has occurred within the club? What would members be doing differently in the club?" "What would you be doing differently?"

The use of this question reframes the problem into positive discussion. Beyond that, the educator has engaged the member to identify, on their own, what changes need to occur to begin to move the club into effectiveness.

Scaling Questions: Scaling questions can be used to identify useful differences for volunteers and may help to establish goals as well. Scaling questions also can help people incrementally set their own goals. When these questions are framed by educators, they enable people to focus on steps that can eventually lead to larger, overall change. Typically, a range from "the worst the problem has ever been" (zero or one) to "the best things could ever possibly be" (ten) is used. The person presenting the problem is asked to rate their current position on the scale, and questions are

then used to help the person identify resources. For example: *"What's stopping our club meetings from slipping one point lower down the scale?"*

Scaling questions that seek exceptions to the problem may be framed like this:

"On a day when our club meeting is one point higher on the scale, what would tell you that it was a 'one point higher' meeting?"

Scaling questions that describe a preferred future may be framed like this:

"Where on the scale would be good enough? What would a club meeting at that point on the scale look like?"

Exception Seeking Questions The objective of this strategy is to refocus the person to search for times when the problem is less severe or absent. Exception seeking questions help people self-identify what has worked in the past and can be used to encourage clientele to repeat such behaviors. Simply asking the person to outline a time when the problem did not exist and then encourage them to describe what different circumstances existed in that case can expose significant behavioral changes that can be tried to resolve the issue.

For example: *"I understand you and Mary are having challenges working together on our committee. You and Mary have been serving for many years together. Can you think of times when you worked well together? Describe how that worked for you? When the problem did not exist, what were you doing then?"*

Discussion

At some point or another, the business of working with people will lend itself to mediating difficult interpersonal situations. Finding the right tools to solve these problems is of critical importance to a volunteer group's overall positive presence in communities. Generally, people have preconceived ideas of how things should work and when they do not take place in such a way, a problem occurs. Many of us have the propensity to focus on the problem and highlight what went wrong. One of the biggest hurdles initially in solving problems is repositioning focus from reliving the issue to thinking about steps that can be taken to solve the problem. By utilizing these solution focused techniques outlined above, educators can transition difficult problems into solutions efficiently.

References

Wallerstedt, C. and P. Higgins. 2000. Solution-focused therapy: Is it useful for nurses in the workplace? AWHONN Lifelines, Volume 4, Issue 1, pages 46–47.

de Shazer, S. 1988. Clues: Investigating solutions in brief therapy. New York, NY: W. W. Norton & Company.

de Shazer, S., I.K. Berg, E. Lipchik, E. Nunnally, A. Molnar, W. Gingerich and M.Weiner-Davis. 1986. Brief therapy: Focused solution development. Family Process 25: 207–221.

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